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TRAFFIC SURVEY

MISSOULA

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URBAN AREA TRAFFIC SURVEY
MISSOULA, MONTANA

CONDUCTED BY THE

MONTANA HIGHWAY COMMISSION
PLANNING SURVEY
AND
THE CITY OF MISSOULA

IN COOPERATION WITH

U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

1953

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SCOTT P. HART, State Highway Engineer

Report Prepared By

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In Cooperation With

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BUREAU OF PUBLIC ROADS

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R. M. ARENZ, District Planning and Programming Engineer

and the

CITY OF MISSOULA

RALPH L. STARR, Mayor
JOHN T. VANCE, Public Safety Commissioner
A. W. SHOBLUM, Street Commissioner
PATRICK J. WHELAN, City Engineer

Higgins Avenue Bridge

TABLE OF CONTENTS

	PAGE
Acknowledgements	i
Letter of Transmittal	ii
Definitions	iii
Survey Highlights	1
Recommendations	2
Introduction	10
Part One -- Internal Origin & Destination Study	22
Part Two -- External Origin & Destination Study	36

LIST OF PLATES

PLATE NO.	DESCRIPTION	PAGE
1	Alternate Truck Routes and Bridge Location	8a
1A	Traffic Flow on Principal Streets	8b
2	Vicinity Map	16
3	Population and Motor Vehicle Trends	17
4	City Map	18
5	Land Use	19
6	Traffic Volumes on Existing Bridges	20
7	Zone Map -- Internal Survey	25
8	All Trips To or From Central Business District	27
9	Zone-to-Zone Travel	29
10	External Traffic Crossing River	31
11	All Traffic Crossing River	33
12	Zone Map -- External Survey	37
13	All Traffic Passing Station 1	39
14	All Trucks Passing Station 1	41
15	All Traffic Passing Station 2	43
16	All Trucks Passing Station 2	45

A C K N O W L E D G E M E N T S

The assistance given by Mayor Starr, the City Police Department, and all Missoula City Officials is gratefully acknowledged. Special recognition is also due the Daily Missoulian and its staff for the outstanding publicity covering this survey. The success of the type of survey conducted in Missoula was immeasurably aided by this publicity.

Our appreciation is also extended to the thousands of motorists who cooperated in spite of some delays and inconvenience while the field data were being collected.

Research and technical data were obtained from published reports of the Bureau of Public Roads, other State Highway Departments, and various traffic agencies.

STATE OF MONTANA
HIGHWAY COMMISSION
HELENA

April 26, 1954

The Honorable Ralph Starr, Mayor
and
City Commissioners
Missoula, Montana

Gentlemen:

We are happy to present this report on the Missoula Traffic Survey conducted during June 1953, as a cooperative project with the Bureau of Public Roads and the City of Missoula.

It is hoped that this report will prove the first step toward alleviation of some of the traffic congestion caused primarily by the location of the Clark Fork River through the City. The factual data presented resulted from a field study to determine a desirable location for a new bridge across the river and possible routes for commercial vehicles to eliminate present objections.

The cooperation of yourself, the other City Officials, and the residents of Missoula was outstanding and made our task a pleasant one.

Let me assure you that the interest of the Highway Commission in the solution of these problems will be a continuing one and that we will cooperate to the fullest extent possible in a program of correction.

Respectfully submitted,

Scott P. Hart

Scott P. Hart
State Highway Engineer

SPH:ctk

DEFINITIONS

INTERNAL ORIGIN AND DESTINATION SURVEY. A study concerned with the origin, destination, and travel habits of motorists crossing a cordon or screen line within an urban area.

EXTERNAL ORIGIN AND DESTINATION SURVEY. A study concerned with the origin, destination, and travel habits of motorists entering or leaving an urban area.

SCREEN LINE. A natural traffic barrier, such as a river or railroad, dividing an urban area.

TRIP. The one-way travel by a single vehicle between a point of origin and a point of destination.

DESIRE LINE. A straight line drawn between points of origin and destination without regard for existing streets or routes.

CENTRAL BUSINESS DISTRICT. That portion of a city containing the major business establishments, commonly called the *downtown area.*

SURVEY HIGHLIGHTS

The average weekday traffic crossing the Clark Fork River during June of 1953 totaled 37,302 vehicles. Of this total 11,501 drivers were interviewed and 13,212 usable cards were returned. Usable card returns accounted for 60 per cent of the total cards passed out.

Trips to and from the central business district total 20,131 or 54 per cent of the total traffic crossing the river. 12,603 trips across the river or 34 per cent were between zones in the metropolitan area outside of the central business district. Traffic from all areas outside Missoula accounted for 6,121 trips or 16 per cent of the total traffic. 1,553 of these external trips across the river had either an origin or destination in the central business district.

The Higgins Avenue bridge was carrying an average of 16,515 vehicles per day during June of 1953, which was 45 per cent of the total traffic on all four bridges. The Orange Street bridge with a total traffic volume of 12,648 vehicles accounted for 34 per cent of the total river crossings and the two bridges at Van Buren and California Streets carried only the remaining 11 per cent of the total traffic.

Approximately 450 heavy commercial units per day now use all or part of Broadway (U.S. 10) through Missoula. 24 per cent of these heavy trucks did not stop in the city and 26 per cent had either an origin or destination south of the Clark Fork River.

The average weekday traffic for June 1953 was 5,905 vehicles on U.S. 10 east of Missoula and 5,095 on U.S. 10 west of Missoula. 1,215 vehicles per day did not stop in the city and could therefore theoretically by-pass the central business district.

RECOMMENDATIONS

TRUCK ROUTES

The external origin and destination survey of east-west traffic through Missoula determined that there were 450 heavy commercial vehicles per day that could theoretically use a truck route. This volume, while not too great, is still considered large enough to warrant construction of a by-pass to alleviate part of the present congestion in the central business district and relieve excessive noise in the hospital and school zones on Broadway. It therefore is recommended that an east-west truck route be constructed.

The need for a truck route can be established, but the location will be difficult to determine due to lack of through streets, streams, and mountainous terrain on the approaches to Missoula. Three alternates have been considered and will be discussed in this report. Their approximate locations are shown on Plate 1.

One of the suggestions contained in the 1947 Traffic Survey of Missoula, was that an east-west truck by-pass be established on Spruce Street and that this street be extended southeasterly along the south side of the Northern Pacific Railway right-of-way to a junction with U.S. 10 near Missoula's east city limits. This proposed extension has now become impracticable from a right-of-way standpoint due to the location of several business and industrial establishments adjacent to U.S. 10 during the past six years. It is now deemed advisable to enter the City north of the Northern Pacific Railway and to underpass the railway in the vicinity of Jackson Street to avoid the more costly right-of-way required for a connection with U.S. 10 near the east city limits.

This new routing should also divert a considerable amount of traffic from U.S. 10 and thus relieve the underpass east of Missoula of much of its present traffic load. If this is not done, it is anticipated that the underpass will require reconstruction to a higher standard within the next few years. Both Alternates A and B follow the general location north of the Northern Pacific Railway.

Alternate A extends westerly to Beech Street from a point on U.S. 10 just east of the Northern Pacific Railway underpass approximately 1¼ miles east of Missoula. It then follows Beech Street, Spruce Street, and Toole Avenue to a junction with U.S. 10 at Broadway. Total length of this route is approximately 3¼ miles.

Minimum construction requirements would be 1.9 miles of roadway from the underpass east of Missoula to Spruce Street, one Northern Pacific underpass near the intersection of Beech and Jackson Streets, and one bridge over Rattlesnake Creek. The present surfacing on Spruce Street and Toole Avenue would probably be adequate for a time but would eventually require reconstruction to a standard that will carry heavy truck traffic.

Right-of-way requirements should present no special problems from the underpass east of Missoula to the bridge site over Rattlesnake Creek. The route from Rattlesnake Creek to Spruce Street, however, would necessarily take a portion of one city block just west of the creek and possibly the corner of a second block between Madison and Jefferson Streets. This would require the purchase of several frame buildings in an area that is now almost completely built up with residential dwelling units. Spruce Street and Toole Avenue have adequate widths to accommodate any traffic volumes in the foreseeable future.

Locating the route on Spruce Street has the disadvantages of passing a grade school and high school between Harris and McCormick Streets and of passing through a Class B residential district in the vicinity of the school. This location has the distinct advantage, however, of tapping the main industrial areas north of the river and providing ready access to the central business district.

Alternate B follows the same general alignment as Alternate A from the underpass east of Missoula to the crossing of Rattlesnake Creek. After the creek is crossed, however, the proposed alignment would follow Railroad Street to Alder Street and thence on Alder to Toole Avenue and a junction with U.S. 10 at Broadway. Total length of this route is also approximately 3¼ miles. Minimum construction requirements would be 2.2 miles of roadway, one underpass, and one bridge over Rattlesnake Creek.

Right-of-way requirements along Railroad Street from Rattlesnake Creek to Alder Street would cost more than on Alternate A due to the present narrow

width of Railroad Street. Widening of this street to a 60-foot minimum would require the purchase of residential and commercial buildings along the south side for a distance of five blocks. Alder Street at present has adequate width to accommodate anticipated traffic volumes, but it too would require that the surface be reconstructed to a higher standard at some future date.

One of the principal advantages of the Alder Street location is that it misses the school and the residential area on Spruce Street. The disadvantages of this location lie in the more costly right-of-way requirements along Railroad Street and the crossing of Harris Street near the top of the ramp to the Harris Street underpass. This crossing of Harris Street with a through truck route could result in a dangerous traffic situation due to limited sight distances and the necessary turning movements of trucks at the intersection. If a signal is installed at the intersection as a traffic control measure, south bound traffic on Harris Street would be forced to stop on a 6 per cent grade coming up the ramp from the underpass to Alder Street. Both A and B Alternates would serve approximately the same volume of trucks and would provide access to the industrial areas north of the river and the central business district equally as well.

Alternate C is the river route, or the Kiwanis Street by-pass. This proposed location leaves U.S. 10 approximately ¼ mile east of the Missoula city limits and follows the river channel through the city to an intersection with U.S. 10 on Broadway near Scott Street. The length of this route is about 1.9 miles, all of which would require heavy construction. The proposed route underpasses three highway bridges and one railroad bridge and crosses Rattlesnake Creek near its confluence with the Clark Fork. If this route is constructed, it would be necessary to modify or reconstruct each of the highway and railroad bridges to provide the necessary vertical clearance above high water.

The Van Buren bridge is an obsolete structure and should be replaced. If this is done, the new structure should be constructed sufficiently high to provide necessary clearance for a truck route on the north end.

The Higgins Avenue bridge was built in 1908 and has been operating at or above practical traffic capacity for a number of years. The recent traffic survey determined that the Higgins Avenue location will continue to best serve

the majority of traffic crossing the river. It also showed that the present traffic volume of 16,515 vehicles is badly overloading and congesting the 30-foot roadway. If the proposed new bridge is constructed at a new location in the eastern part of the city, it is estimated that the Higgins Avenue bridge will still be carrying approximately 12,000 vehicles per day. This volume of traffic warrants a four-lane structure, especially since there are four lanes on Higgins Avenue on the north and south of the bridge.

A plan has been formulated to widen and shorten this structure in connection with the construction of the river truck route. The proposed plan, briefly, would consist of channel-changing the river by confining it to the south channel under the bridge. This can be done by constructing a retaining dike near the east end of the island and deepening the channel on the south. After the river has been confined, it would be feasible to shorten the structure to about half of its present length of 1,022 feet and construct an underpass to separate the grades between Higgins Avenue and the proposed truck route.

The underpassing of the Orange Street bridge should not require any major modification of the present structure as the north approach span is a steel girder with ample vertical and horizontal clearances for a truck route. A suitable retaining wall on the river side will be necessary at the undercrossing, however, as a safeguard against high water. It will also be necessary to provide access at this point from the truck route to the Orange Street bridge.

The route, as now proposed, will cross under the Northern Pacific's railway bridge near Blanche Street. If this underpass is practicable from a construction standpoint, an easy grade can be obtained from the railroad bridge to a junction with U.S. 10 on Broadway. A thorough field investigation may indicate that underpassing the railroad is not feasible without a grade raise or extensive reconstruction of the present railroad bridge. If either of these contingencies is indicated, it is recommended that the proposed routing be revised to join U.S. 10 on Broadway east of the railway bridge near May Street. This revised routing will have the disadvantage of a slightly steeper approach grade to U.S. 10 and will force traffic to move up and down this grade in the vicinity of St. Patrick's Hospital.

The main advantages of the river route are listed as follows:

1. Less damage to adjacent property which should reduce cost of securing right-of-way.

2. The routing does not traverse a residential district.

3. It would tie together other proposed solutions for Missoula's traffic problems, such as the widening of the Higgins Avenue bridge and the construction of a bridge and overpass to replace the bridge on Van Buren Street.

4. The routing provides access to the business district through connections with Clay, Pattie, and Stevens Streets.

The disadvantages of this route are as follows:

1. It does not directly tap any of the industrial areas in the city.

2. It does not provide ready access to the south side of the city due to underpassing of all bridges.

3. Construction of this route would require an underpass at Higgins Avenue, and possibly reconstruction of the Northern Pacific Railroad bridge in addition to the proposed construction of the Van Buren bridge and the widening of the Higgins Avenue structure.

4. Due to the very large program involved, it will be necessary to spread construction over a period of several years in order to finance the various projects. Therefore, Missoula will not be able to have a completed truck route for at least five years.

A logical construction program would be as follows:

1. Construction of the proposed bridge and overpasses near Maurice Avenue.

2. Widening and shortening of the Higgins Avenue bridge and the construction of the truck route overpass on the north.

3. Construction of the truck route and the possible modification of the railway bridge at Blanche Street.

A summary of the three routes follows:

ROUTE	ROUTE LENGTH	CONSTRUCTION LENGTH	NUMBER OF BRIDGES	NUMBER OF UNDERPASSES	ESTIMATED AVERAGE TRUCK VOLUME	ESTIMATED AVERAGE TRAFFIC VOLUME
A	3.25 Miles	1.9 Miles	1	1	360	2100
B	3.25 Miles	2.2 Miles	1	1	360	1600
C	1.90 Miles	1.9 Miles	1	4	304	1800

The controlling factor in the selection of any of the three proposed routes will probably be cost. As no cost data are available, it is recommended that each of the routes be surveyed and a comprehensive cost estimate compiled. This cost estimate should include a detailed study of the feasibility of shortening and widening the Higgins Avenue bridge and the possibility of salvaging the steel girders on the north to be used in the widening process.

REPLACEMENT OF VAN BUREN STREET BRIDGE

Desire lines of traffic compiled from the internal origin and destination data indicate that any crossing of the river should be located between Van Buren and Higgins Avenue and as near the central business district as practicable. A field investigation indicates that the only feasible bridge and overpass sites from a construction standpoint lie in the vicinity of, or east of, Maurice Avenue. Any site in this locality is not near enough to the business district to serve the maximum amount of traffic, but it is estimated that a minimum of 8,000 vehicles per day can be expected to use a bridge in this vicinity immediately after construction. By 1970 this volume will have increased to at least 10,000 vehicles per day. This estimate has been compiled strictly on a desire line basis. It does not take into consideration those vehicles that can be expected to use the facility in order to avoid the congestion on Higgins Avenue.

A combination bridge and overpass near Maurice Avenue will eliminate an obsolete bridge and a dangerous Milwaukee Railroad grade crossing on Van Buren Street. This crossing has been rated the highest in index of hazard on the entire Milwaukee system in Montana. Eighteen accidents involving considerable property damage and two personal injuries can be charged against this crossing during the past ten years.

In view of the obsolescence of the Van Buren Street bridge, the elimination of a dangerous railway grade crossing by the proposed overpass, and the volume of traffic that can be expected to use this structure, it is recommended that a combination bridge and overpass be constructed near the Maurice Avenue location.

HIGGINS AVENUE BRIDGE

After construction of a bridge near Maurice Avenue, it is estimated that the Higgins Avenue structure will still be carrying approximately 12,000 vehicles per day. Under normal conditions this traffic volume will have increased to at least 16,000 vehicles per day by 1970, or to about the present volume that it is now carrying. The 30-foot roadway is a definite traffic bottleneck due to the four traffic lanes on Higgins Avenue being constricted to two lanes across the bridge.

It is therefore recommended that a structure be provided to accommodate four lanes of traffic at this location.

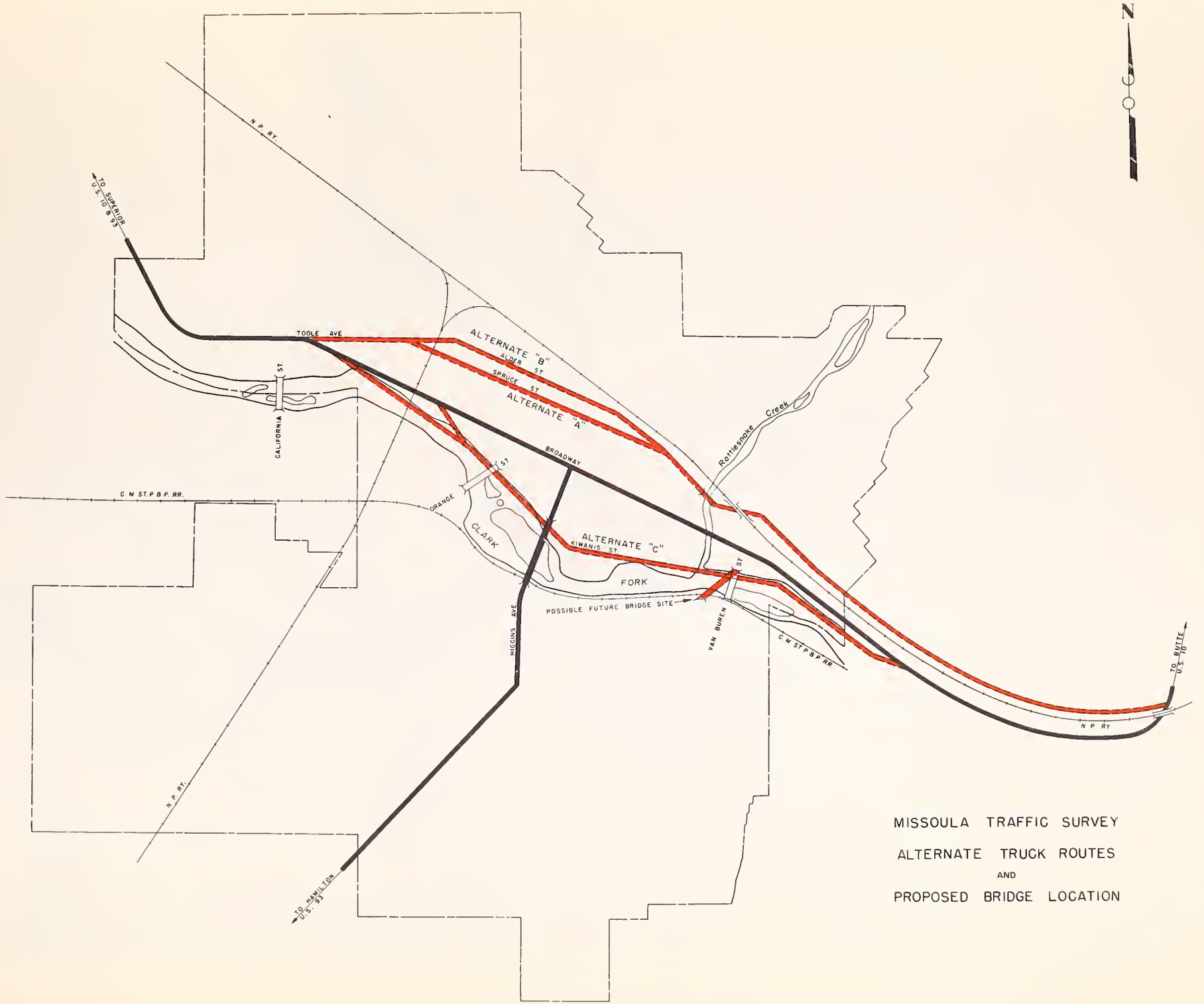
CALIFORNIA STREET BRIDGE

The bridge at California Street is of similar design to the structure on Van Buren Street. Both bridges, due to extremely light trusses and limited clearances, are obsolete by present standard and should be replaced. The replacement of the California Street bridge is considered to be of secondary importance, however, to the replacement of the Van Buren bridge and the recommended widening of the Higgins Avenue structure.

ANGLE PARKING ON BROADWAY

The practice of angle parking on Broadway in the central business district contributes in a large measure to the general traffic congestion. If a change is made to parallel parking, the present street width of 66 feet can accommodate four lanes of traffic and two 8-foot parking lanes. This will result in a substantial increase in the traffic carrying capacity of the street and will decrease present congestion. It is recommended that a change be made to parallel parking and that four lanes of traffic be established on Broadway through the central business district.

PLATE 1

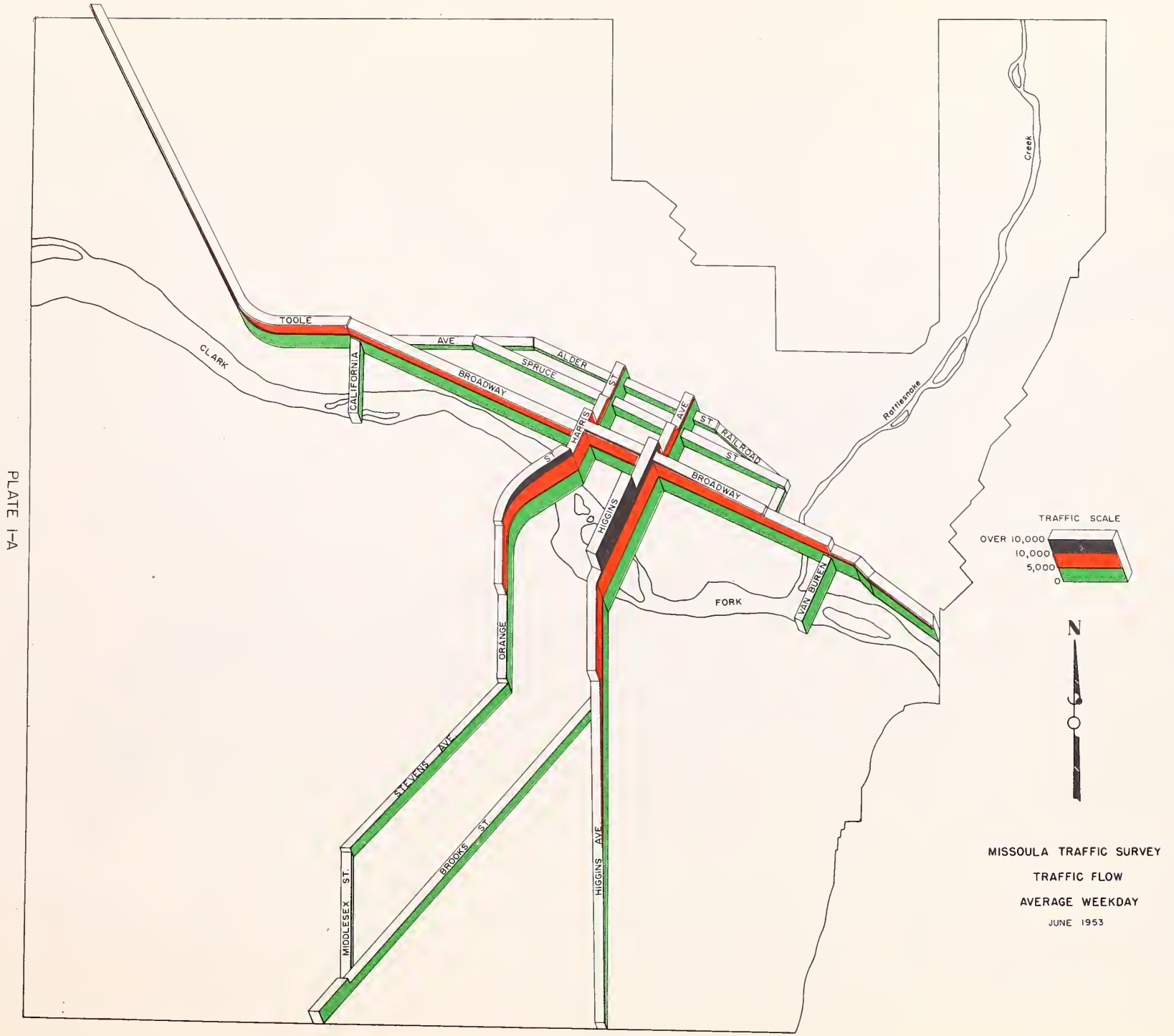


MISSOULA TRAFFIC SURVEY

ALTERNATE TRUCK ROUTES

AND

PROPOSED BRIDGE LOCATION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BROADWAY
HIGGINS
Rattlesnake
Creek
FORK
VAN BUREN
ORANGE
STEVENS AVE.
BROOKS ST.
MIDDLESEX ST.
HIGGINS AVE.
TRAFFIC SCALE
OVER 10,000
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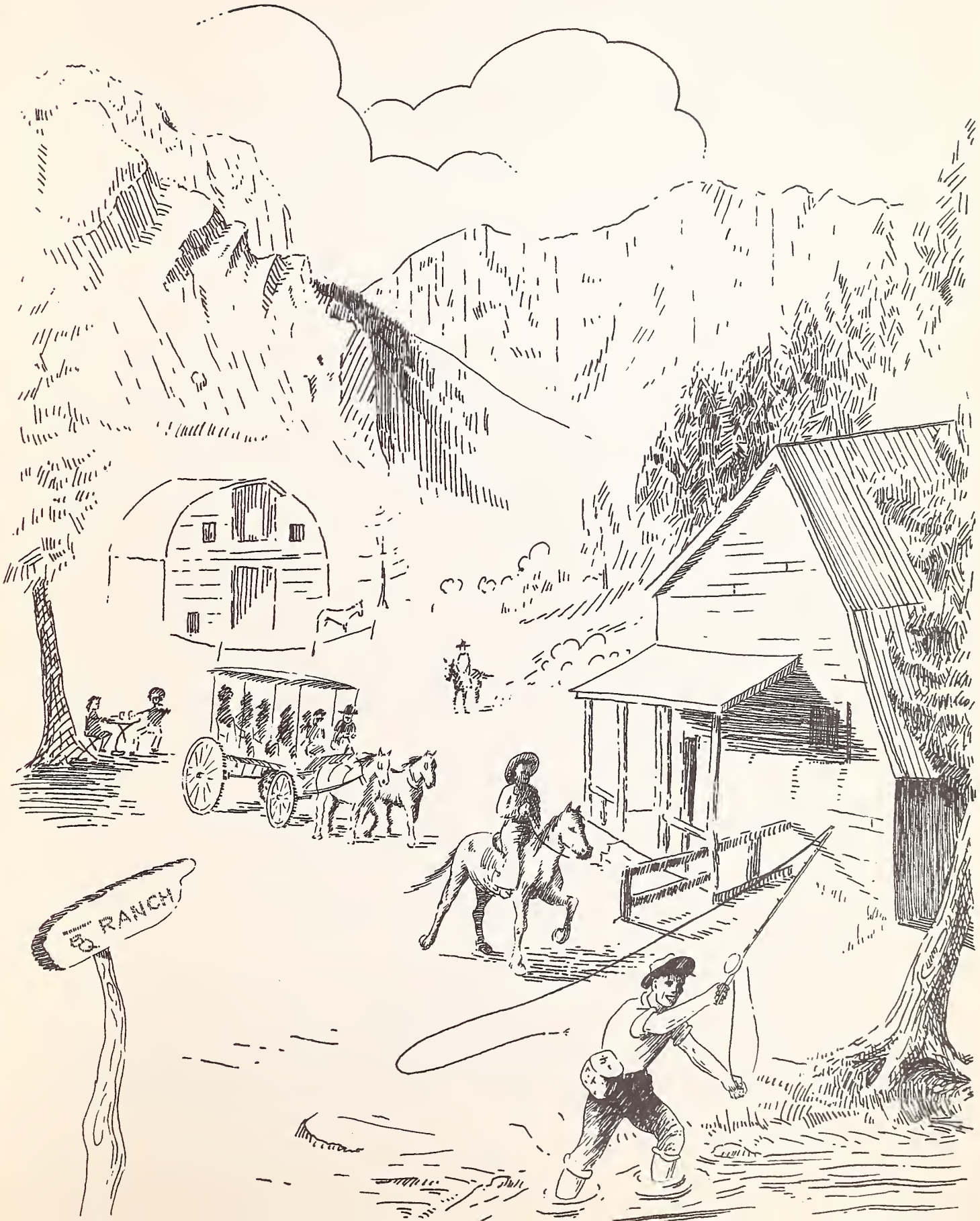
MISSOULA TRAFFIC SURVEY
TRAFFIC FLOW
AVERAGE WEEKDAY
JUNE 1953

PLATE I-A

Introduction



INTRODUCTION

GENERAL

Missoula is Montana's fourth largest city with a 1950 population of 22,485. Located near the confluence of the Bitterroot and Clark Fork Rivers, the city forms the hub of two large and very productive valleys. The Clark Fork River, flowing from east to west, divides the metropolitan area roughly into two equal segments. In the north section are located the central business district, the greater part of the industrial area, and some residential property. In the section south of the river are located some of the better residential districts, the campus of the University of Montana, and industrial properties along both the Milwaukee Railroad and the Northern Pacific's Bitterroot Branch. Numerous small acreage tracts devoted to intensified fruit and vegetable farming are located to the west and south of the city limits.

Four highway bridges and one railway bridge cross the river. Two of the highway bridges were constructed during the era of the horse and buggy and are still in use. The original townsite to the north was laid out parallel to the river; consequently, the streets run at a decided angle. Some subsequent additions were laid out on a north-south grid system, while others parallel the streets in the original townsite. Ample provisions for parks and playgrounds were made in most additions, and well-kept boulevards enhance the beauty of the city.

HISTORY

Hellgate, or Missoula, as the city later became known, owes its origin to Frank L. Worden and C. P. Higgins, who in 1850 came into the territory from Walla Walla and established a general store and trading post near the Hellgate Ford of the Clark Fork River.

Prior to this time there had been few white people in the area, and the river ford was used principally by the Flathead and Nez Perce' Indians in passing from the Bitterroot Valley to the buffalo hunting grounds on the eastern slopes of the Continental Divide. It was at this ford also that their

enemies, the Blackfeet Tribe, would lay in ambush, and many bloody Indian battles were fought in the vicinity. Thus the name Hellgate, which is a loose interpretation of the Indian word for a place of fear, was given to the ford and the river by the early settlers.

In 1865 the trading post was moved eastward a short distance to the present townsite of Missoula, and a sawmill and gristmill were added to the general line of trade goods. By 1870, due largely to the discovery of gold in the surrounding area, Missoula had grown into a sizeable village able to support several stores and saloons, a newspaper, and a public school. It was in this year also that the first census was taken which determined that there were 2,084 males and 470 females dwelling within the boundaries of old Missoula County.

Early rumors of the coming of the railroad reached the thriving boom town as early as 1870. It was not until the spring of 1883, however, that the Northern Pacific Railway was completed through Missoula from the west. Later in the same year, the eastern and western termini of the new transcontinental line were joined at a point near Gold Creek. President U. S. Grant attended the celebration during which a golden spike was driven to commemorate this event.

The completion of the railroad brought civilization much nearer to the new territory and was primarily responsible for the influx of permanent settlers which occurred during the next decade.

The State Legislature of 1893 enacted a law to establish a university at Missoula. Funds accruing to the State from a Federal land grant were used to build the necessary buildings and finance the school's first years.

Thus in the short span of less than fifty years, Missoula had advanced from a frontier trading post to a university city.

COMMERCE

Missoula is the natural trading center for a vast area in western Montana. Diversified farming and fruit and berry culture are the more important agricultural pursuits on the smaller acreage tracts in the irrigated valleys. Large livestock operations are carried on in the mountains with the aid of good grazing in the forest reserves. That the rural trade is an important

factor in the community's economy is evidenced by a sugar factory, numerous creameries, and several implement dealers.

The mountains near the city, combined with a mild climate, have proven to be a natural setting for recreational pursuits. Numerous lakes and streams entice the fisherman to try his luck, and large dude ranches offer a variety of entertainment to out-of-state visitors and guests. The tourist business in Montana has attained third place in the ranks of industry, and it will contribute substantially to the continuing prosperity of Missoula.

The University of Montana at Missoula, with a present enrollment of 2,400 students, contributes much to the stability and culture of the community. A new field house having a seating capacity of 6,500 is one of a group of new buildings completed on the campus during the past few years.

Regional headquarters of the United States Forest Service are located in Missoula, and just west of the city a new Forest Service Training School for paratrooper firefighters is being constructed. The old school on Nine Mile Creek was primarily responsible for developing the technique of fighting forest fires by dropping men and equipment by parachute.

INDUSTRY

Lumbering and the processing of lumber are the most important industries in Missoula. Several large sawmills, sash and door factories, and cabinet shops have located in the city. These plants constitute the largest payroll in the area. Other industries include the Northern Pacific Division Shop, a sugar factory, brewery, and numerous processing plants for agricultural products.

TRANSPORTATION

Two major transcontinental railroads, the Northern Pacific and the Chicago, Milwaukee, St. Paul, and Pacific, operate through Missoula. Branch lines of these railroads link the city with the Bitterroot, Flathead, and Blackfoot Valleys. Freight service is provided on all lines, and both railroads operate streamliners from the West Coast to Chicago for fast passenger service.

Two transcontinental Federal highways, U.S. 10 and U.S. 93, provide

access to the City from the east and west, and north and south respectively. U.S. 10 has been placed on the National Interstate System and now carries the heaviest traffic in Montana. In addition to primary highways, several secondary and county all-weather roads radiate from the city, enabling the farmers and ranchers to bring in produce and take out supplies without difficulty.

Northwest Airlines serve Missoula from a modern airport. Contract hauling of both freight and passengers is done by Johnson Flying Service - one of the outstanding non-scheduled carriers in the Northwest.

Additional transportation facilities include three bus lines and eight motor freight companies which provide direct connections to all parts of the country.

THE TRAFFIC PROBLEM

Missoula's traffic problems are somewhat complicated by the city being divided by a major river. The location of the main business district on the north and the residential districts on the south creates a large volume of trips that cross the river daily to carry on the normal business of the city. Four highway bridges, located on Van Buren Street, Higgins Avenue, Orange Street, and California Street, now carry the traffic, with the Higgins Avenue structure carrying approximately 45 per cent of the total load. The Van Buren and California Street bridges have been obsolete for a number of years in both horizontal clearance and load-bearing capacity. Both structures now have posted maximum load limits that prohibit all but the lightest of commercial vehicles. Due to the capacity limitations on the Van Buren structure and the sharp increase in traffic since the war, the Higgins Avenue bridge has been operating at or above practical two-lane capacity for a number of years. The recent opening of the field house just south of the Van Buren bridge has amplified an already serious traffic situation.

As late as thirty years ago, one of the measures of the prosperity of an urban community was regarded as the amount of traffic on Main Street. Consequently, all traffic and most highways were routed through the center of the city. With the advent of the modern automobile and the accompanying heavy commercial vehicle, signs of traffic congestion began to appear, and some

thought was given to routing traffic around the city or the central business district.

Missoula is no better or worse from a traffic standpoint than other cities of similar size. U.S. 10 enters from the east on Broadway and carries a comparatively large volume of traffic directly through an already congested business district. The logging industry necessarily uses large trucks to haul logs from operations in the vicinity to the mills in Missoula and Bonner. These units, in addition to the normal heavy commercial traffic on U.S. 10, increase the congestion in the downtown area.

THE SURVEY

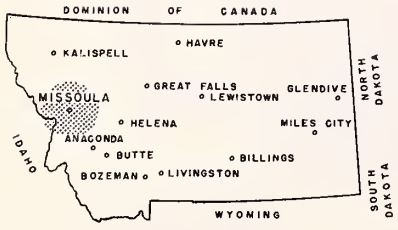
A partial traffic survey of Missoula was made in August of 1947 to determine the relative need for an east-west truck by-pass and a new bridge across the Clark Fork river. The need for a bridge and a truck route was established at that time but a definite bridge site was not located due to lack of internal origin and destination data.

During the past six years, Missoula and its environs have expanded to the south to a greater degree than was anticipated in 1947. As a result of this expansion, the traffic load on the existing bridges in 1953 had already exceeded the 1970 estimates that were made in 1947.

In an effort to alleviate some of the present congestion, an internal origin and destination survey was conducted on all highway bridges for the primary purpose of determining a possible new bridge site which would serve the maximum amount of traffic and relieve the Higgins Avenue bridge of part of its present traffic load.

A supplementary external origin and destination survey was also made on U.S. 10 to ascertain the amount of traffic that could now use an east-west by-pass. Both surveys were conducted jointly by the Bureau of Public Roads, the City of Missoula, and the Montana Highway Commission.

Graphic Presentation



DIAGRAMMATIC MAP
OF
MONTANA

MISSOULA TRAFFIC SURVEY

VICINITY MAP

PLATE 2

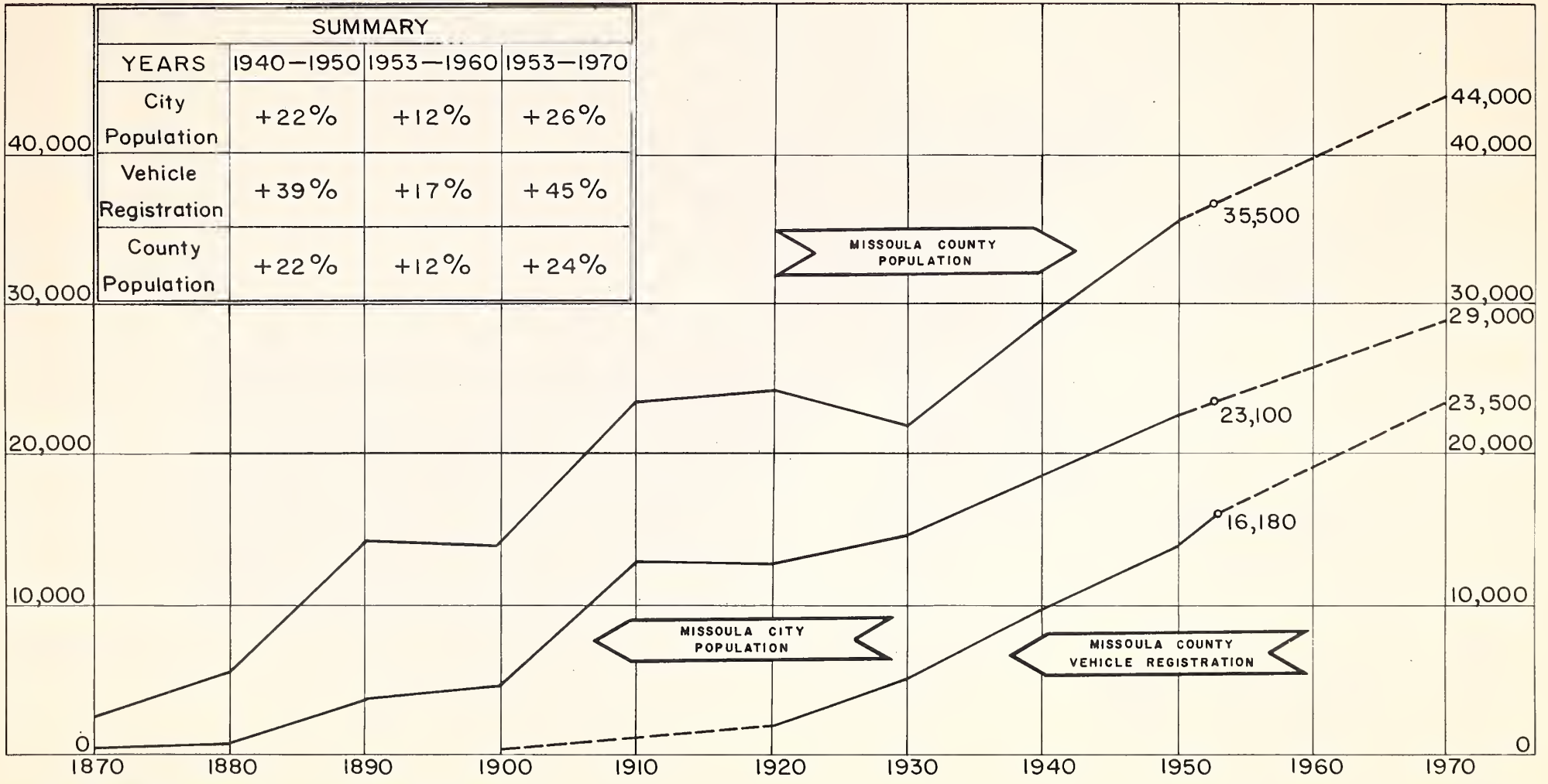
MISSOULA TRAFFIC SURVEY

POPULATION AND MOTOR VEHICLE TRENDS

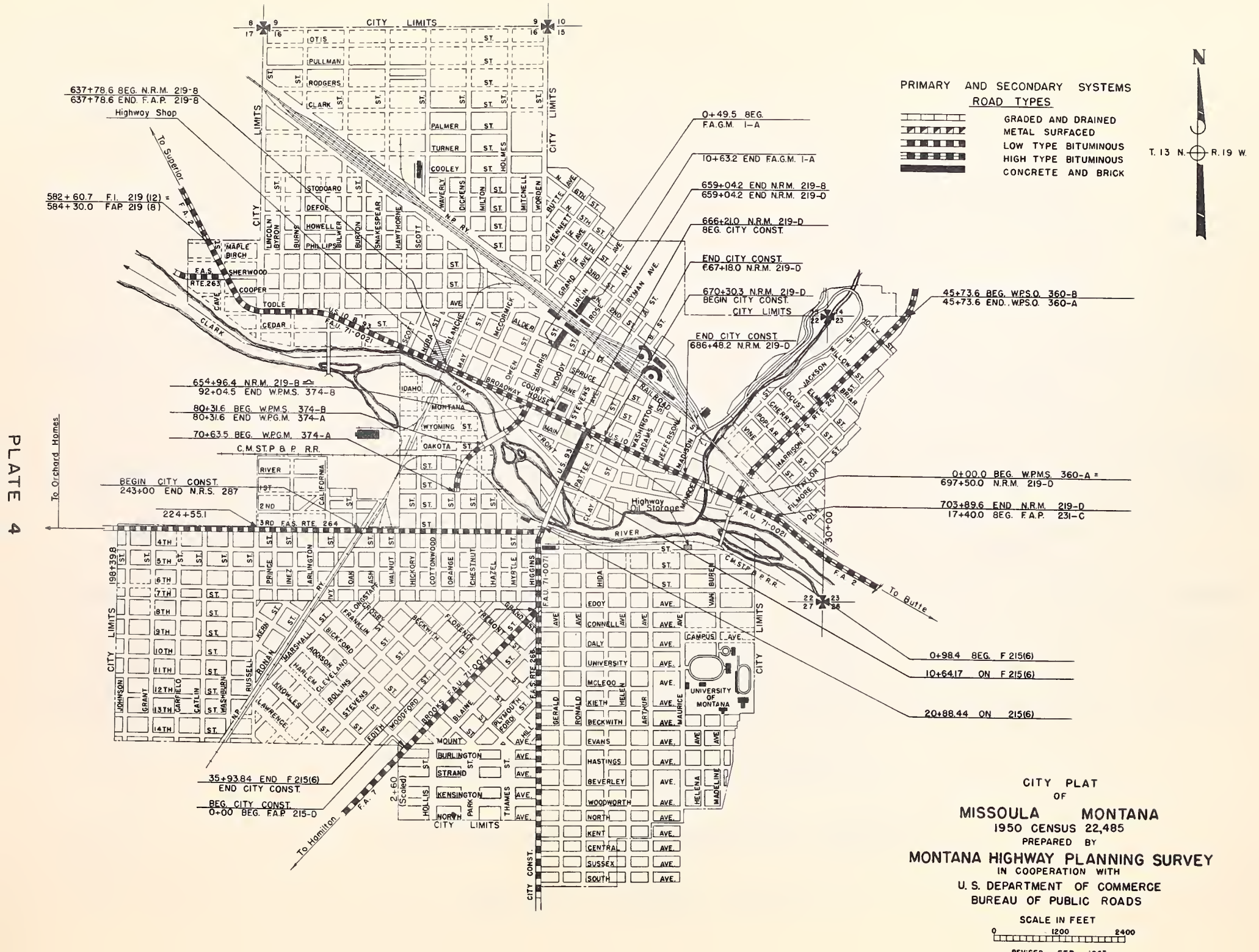
MISSOULA AND MISSOULA COUNTY

PLATE 3

SUMMARY			
YEARS	1940—1950	1953—1960	1953—1970
City Population	+22%	+12%	+26%
Vehicle Registration	+39%	+17%	+45%
County Population	+22%	+12%	+24%



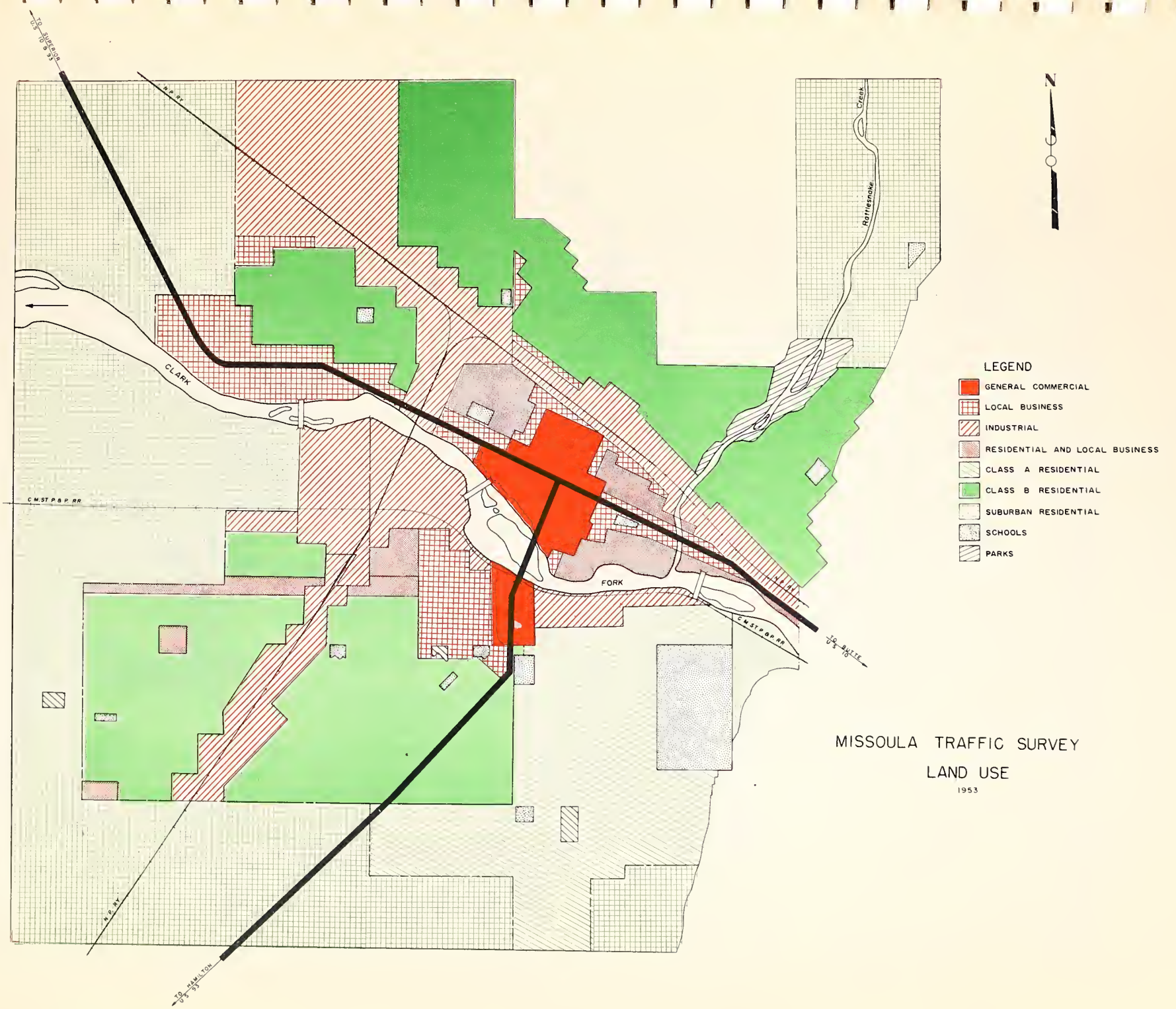
SIZE OF COUNTY REDUCED BETWEEN 1890—1900



CITY PLAT
OF
MISSOULA MONTANA
1950 CENSUS 22,485
PREPARED BY
MONTANA HIGHWAY PLANNING SURVEY
IN COOPERATION WITH
U. S. DEPARTMENT OF COMMERCE
BUREAU OF PUBLIC ROADS

SCALE IN FEET
0 1200 2400

PLATE 5



MISSOULA TRAFFIC SURVEY

LAND USE

1953

MISSOULA TRAFFIC SURVEY

TRAFFIC VOLUMES AT EXISTING BRIDGES

AVERAGE 24 HOUR WEEKDAY

JUNE 1953

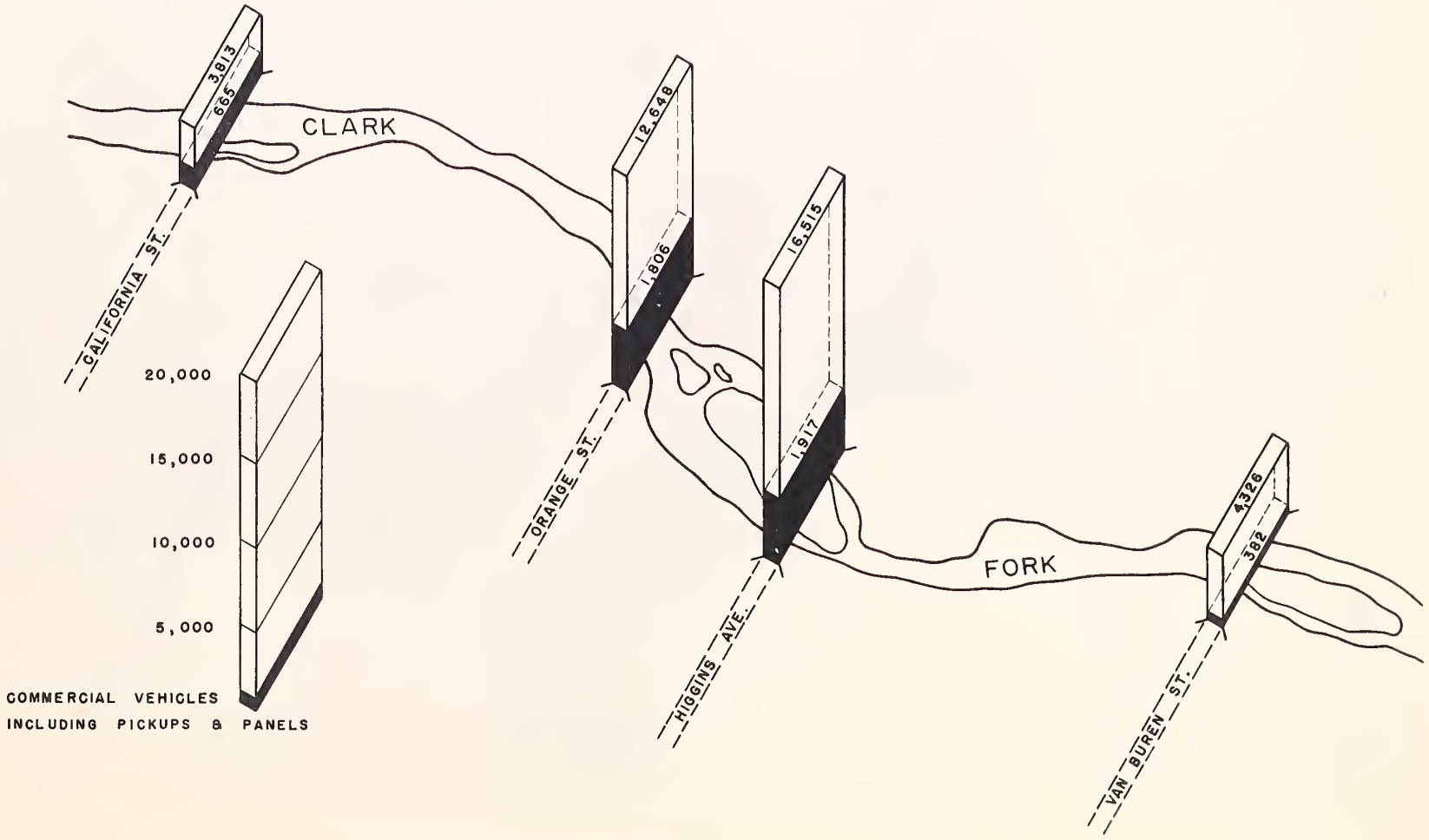
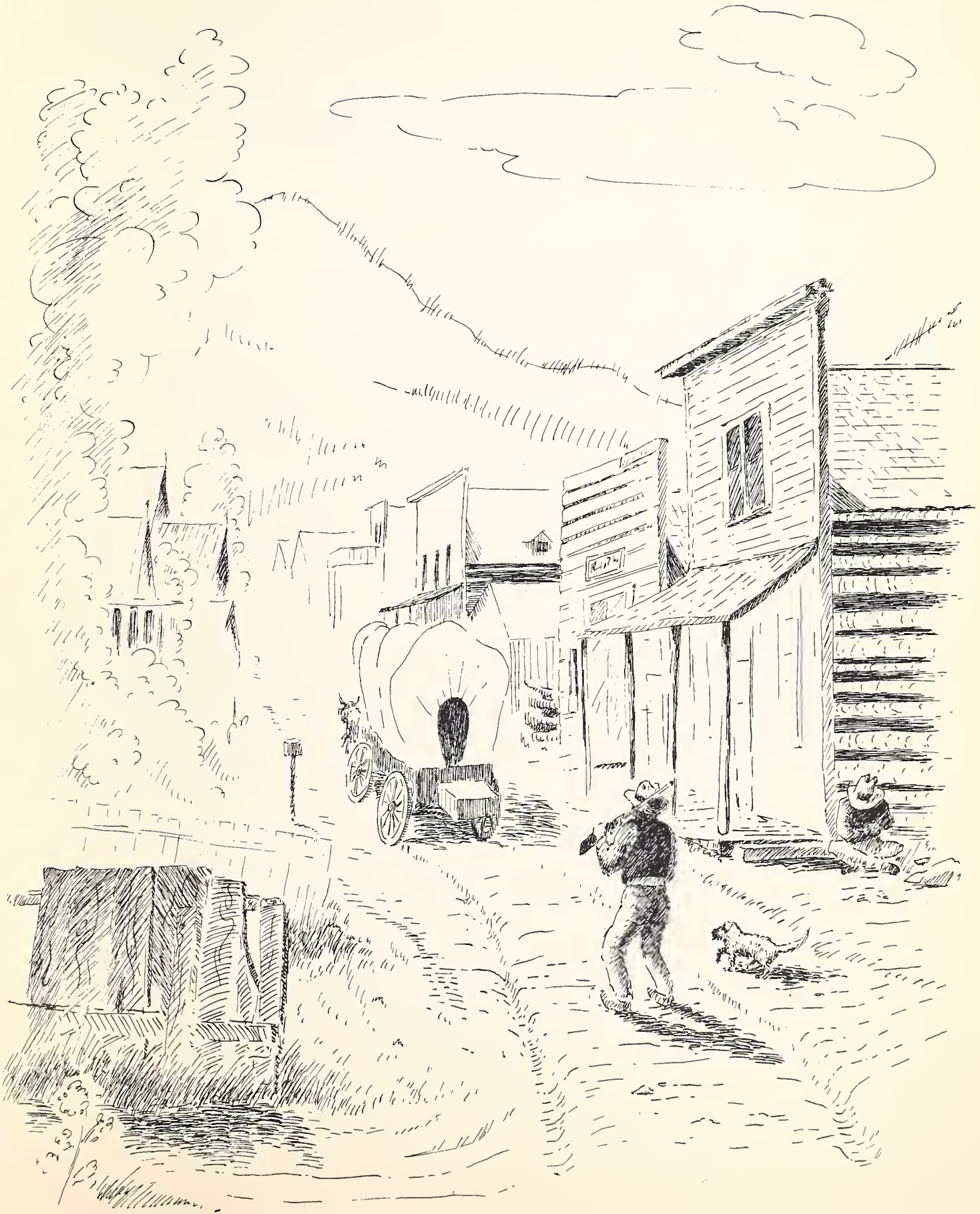


PLATE 6

Part One

Internal Origin and Destination Study



INTERNAL
ORIGIN & DESTINATION STUDY

Any proposed location or relocation of a highway improvement should be based on some study of the traffic needs in the vicinity. When a proposed improvement consists of a major bridge and approaches, the cost of the project warrants an extensive traffic investigation. Three main points should be resolved by factual traffic data. First, the need for an improvement must be established second, the location, from a traffic standpoint, must be selected, and third, the probable traffic volumes that will use the improvement must be determined.

Established practice indicates that the most feasible method of obtaining data on the travel habits of the inhabitants of cities under 50,000 is by the roadside interview method, either on a cordon line around the business district, or on a natural barrier such as a stream or railroad.

In Missoula, the natural barrier, or screen line, is the Clark Fork River. Accordingly, eight interview stations were established at all bridge ends so that traffic crossing the river could be interviewed in both directions. Preliminary counts were then taken to determine the average weekday traffic volumes at each station. In view of the heavy traffic volumes on both the Higgins Avenue and the Orange Street bridges, it was decided to supplement the interviews by passing out post cards which, if properly filled out by the motorist, would yield essentially the same information. Due to inclement weather during the survey, more post cards were passed out than was originally planned. Trips made by delivery trucks and taxis were recorded on a special log which was furnished to the companies in advance of the survey. These vehicles were identified by an exempt windshield sticker and were passed through the stations without delay.

All stations were operated simultaneously for a minimum of 16 hours, and the four heavier stations on the two main bridges were operated for a full 24-hour period on alternate weekdays. Data obtained from both the interviews and the returned cards consisted of origin, destination, and vehicle type. All cards were serially numbered in such a manner that the bridge, direction of travel, and the time that the card was passed out could be identified.

The volume of traffic crossing the river on an average weekday in June,

1953, was 37,302 vehicles. Of this number, 11,501 drivers were interviewed, and 13,212 usable cards were returned. Usable interviews and card returns, combined, accounted for 66% of the total traffic. Due to the excellent publicity given to the survey by the *Daily Missoulian* and local radio stations, over 60% of the cards were returned.

MISSOULA TRAFFIC SURVEY **Nº 35342**

Please help solve some of your city's traffic problems by answering the following questions and then mail this card at once. No postage is necessary. Read instructions carefully.

I came from _____.
(Place or address of last stop before receiving card)

I went to _____
(Place or address of next stop after receiving card)

I was driving: ☐ Passenger Car ☐ Pickup or Panel Truck
(check one) ☐ Other Single Unit Truck ☐ Combination Truck and Trailer

If you were driving between places in Missoula give addresses or name of business establishments in the city. If you came or went to a place outside of Missoula give name of city or town. If nearest town is Missoula then give the approximate location of stop such as "3½ miles south of Missoula." Each card you get is for ONE bridge crossing. Please complete and mail EVERY card.

THURBER'S, HELENA

THANK YOU

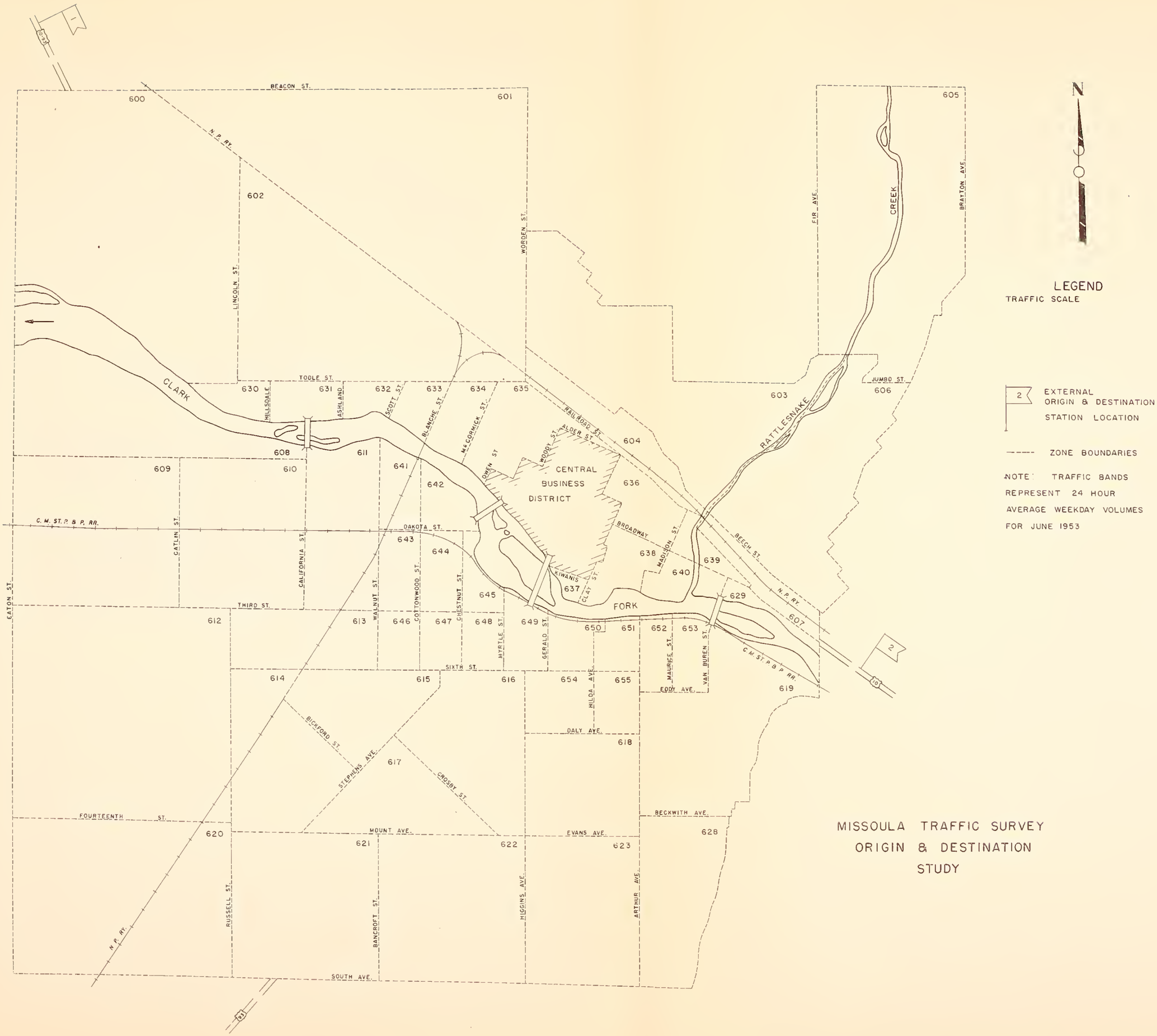
SAMPLE INTERVIEW CARD

To provide factors for expanding the sample to a 24-hour average, directional classification counts were taken on all bridges during the hours of interviewing.

The areas in or near Missoula were divided into zones which were assigned an identifying number. Each trip was then located in the proper zone and coded for processing on International Business Machines.

The most useful purpose of origin and destination data is to establish the desire lines of travel extending from point of origin to point of destination. These straight lines of travel plotted to scale represent the travel desires of motorists without regard to existing routes. When these desire lines are analyzed closely, it is possible to gain some indication of the most desirable location of a street or highway improvement from a traffic standpoint.

The following charts show the desire lines of travel for those vehicles that crossed the Clark Fork River during an average weekday in June of 1953.



LEGEND

TRAFFIC SCALE

2 EXTERNAL ORIGIN & DESTINATION STATION LOCATION

----- ZONE BOUNDARIES

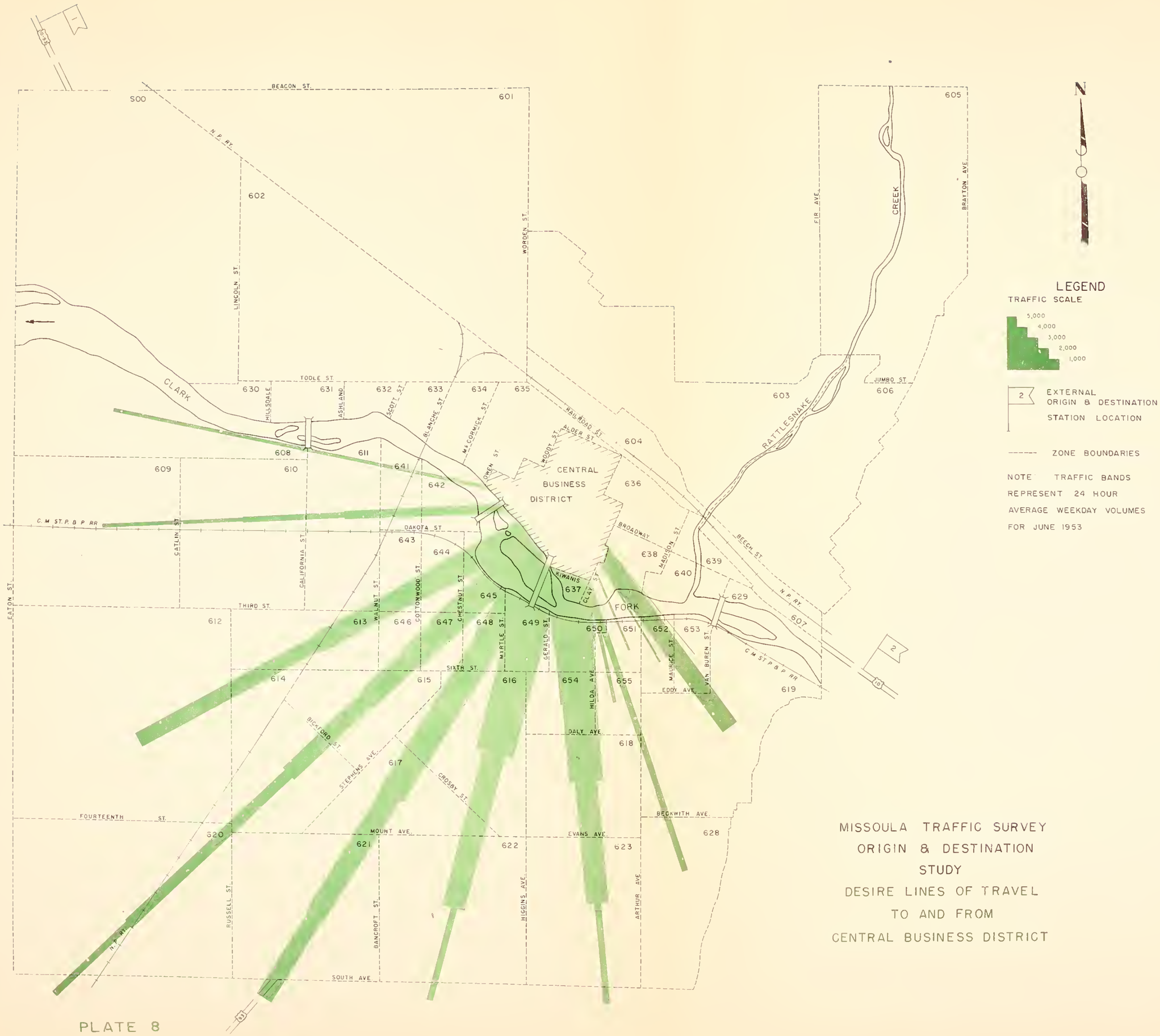
NOTE: TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR JUNE 1953

MISSOULA TRAFFIC SURVEY ORIGIN & DESTINATION STUDY

ALL TRIPS TO OR FROM CENTRAL BUSINESS DISTRICT

Plate 8 illustrates the approximate traffic desire lines of all trips across the Clark Fork River that had either an origin or destination in the central business district of Missoula.

20,131 trips representing 54% of the total traffic volume crossing the river had either an origin or destination in the central business district. 8% of the total trips to the business district had either an origin or destination outside of the urban area.



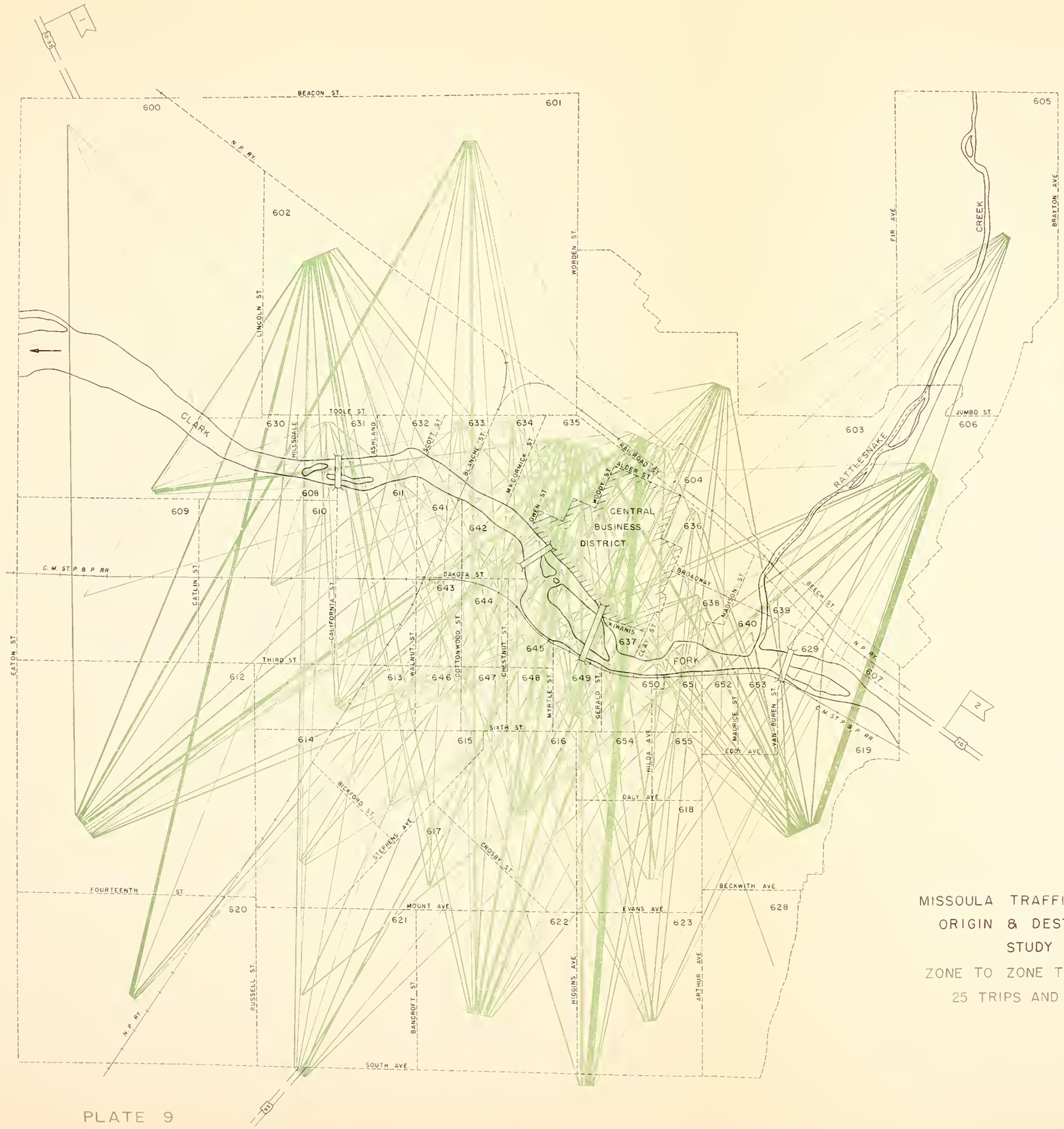
MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DESIRE LINES OF TRAVEL TO AND FROM CENTRAL BUSINESS DISTRICT

PLATE 8

ZONE TO ZONE TRAVEL OUTSIDE THE CENTRAL BUSINESS DISTRICT

Travel to and from areas within the City of Missoula, not including the central business district, accounted for 12,603 trips per day, or 34% of the total traffic across the Clark Fork River.

In the interests of clarity, only those trips with a volume range of 25 or more have been plotted on Plate 9. Zone-to-zone movements of less than 25 trips have not been shown, due to their relative unimportance.



N

LEGEND

TRAFFIC SCALE

2 000
1600
1200
800
400

2 EXTERNAL ORIGIN & DESTINATION STATION LOCATION

ZONE BOUNDARIES

NOTE: TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR JUNE 1953

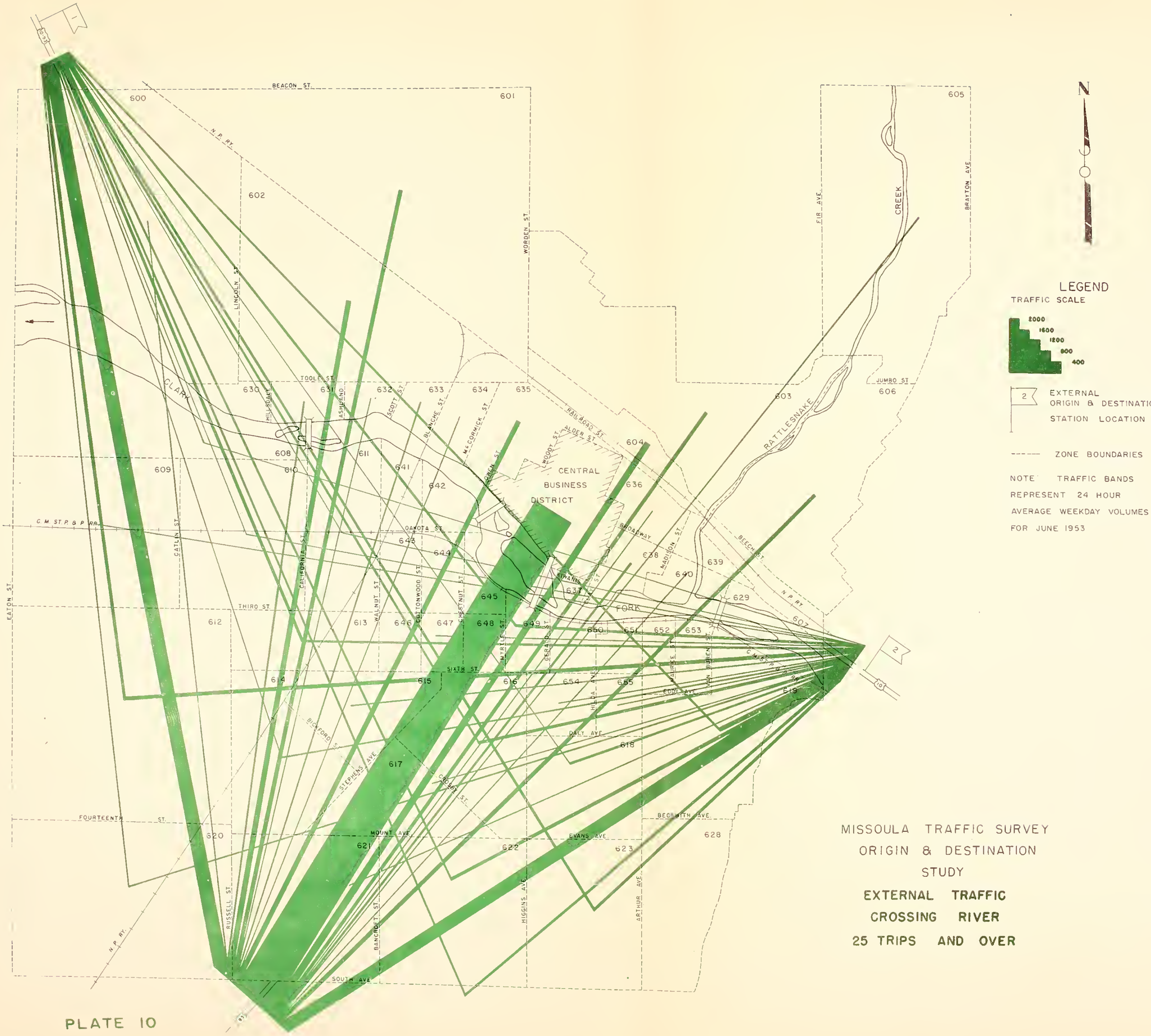
MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
ZONE TO ZONE TRAFFIC
25 TRIPS AND OVER

PLATE 9

EXTERNAL TRAFFIC CROSSING THE CLARK FORK RIVER

Plate 10 illustrates the desire lines of 6,121 trips that crossed the river but had either an origin or destination outside the urban area.

These trips represent 16% of the total traffic during an average weekday in June, 1953. Only those volumes of 25 or more trips per day have been plotted.


BEACON ST.
N.P. RY.
LINCOLN ST.
WORDEN ST.
FIR AVE.
CREEK
BRAYTON AVE.
CLARK
TOOLE ST.
HILLSDALE
ASHLAND
SCOTT ST.
BLANCHE ST.
McCORMICK ST.
RAILROAD ST.
ALDER ST.
WOODY ST.
JUMBO ST.
RATTLESNAKE
CENTRAL
BUSINESS
DISTRICT
C.M.ST.P.&P.RR.
CATLIN ST.
OAKOTA ST.
CALIFORNIA ST.
BROADWAY
MADISON ST.
BEECH ST.
EATON ST.
THIRD ST.
WALNUT ST.
COTTONWOOD ST.
CHESTNUT ST.
MYRTLE ST.
GERARD ST.
FORK
TWANIS ST.
VALLEY ST.
VALLEY DR.
VAN BUREN ST.
SIXTH ST.
HILDA AVE.
EDDY AVE.
DALY AVE.
BICKFORD ST.
STEPHENS AVE.
CROSBY ST.
FOURTEENTH ST.
MOUNT AVE.
EVANS AVE.
BECKWITH AVE.
RUSSELL ST.
BANCROFT ST.
HIGGINS AVE.
ARTHUR AVE.
SOUTH AVE.
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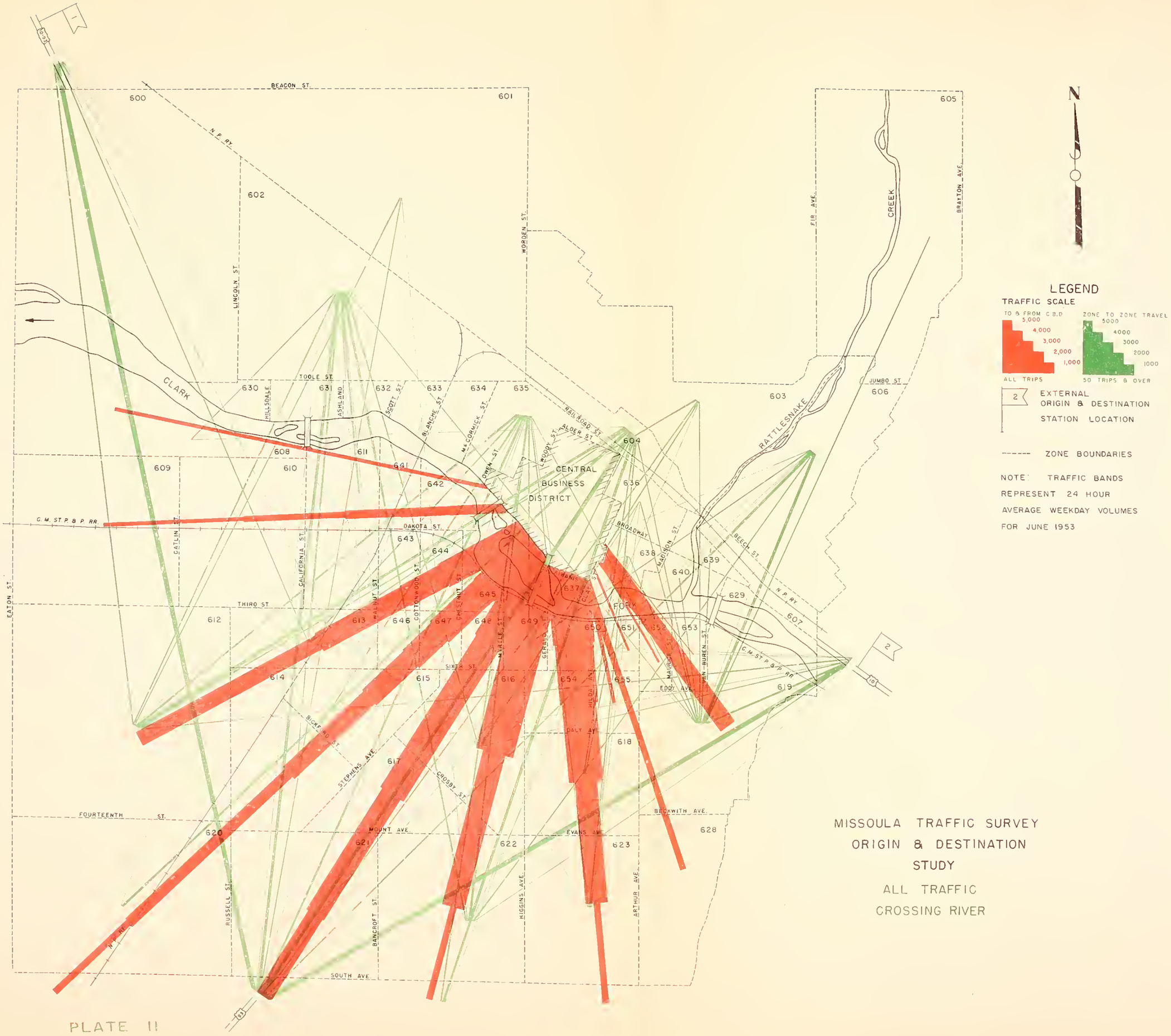
LEGEND
TRAFFIC SCALE
2000
1600
1200
800
400
EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR JUNE 1953
MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
EXTERNAL TRAFFIC
CROSSING RIVER
25 TRIPS AND OVER

PLATE 10

ALL TRAFFIC CROSSING THE CLARK FORK RIVER

Plate 11 is a composite of the major desire lines of travel crossing the river during an average weekday in June, 1953. In order to clarify the chart, only those zone-to-zone trips with a volume range of 50 and over have been plotted. It will be noted that the predominant desire lines cross the river in the vicinity of the Higgins Avenue bridge.

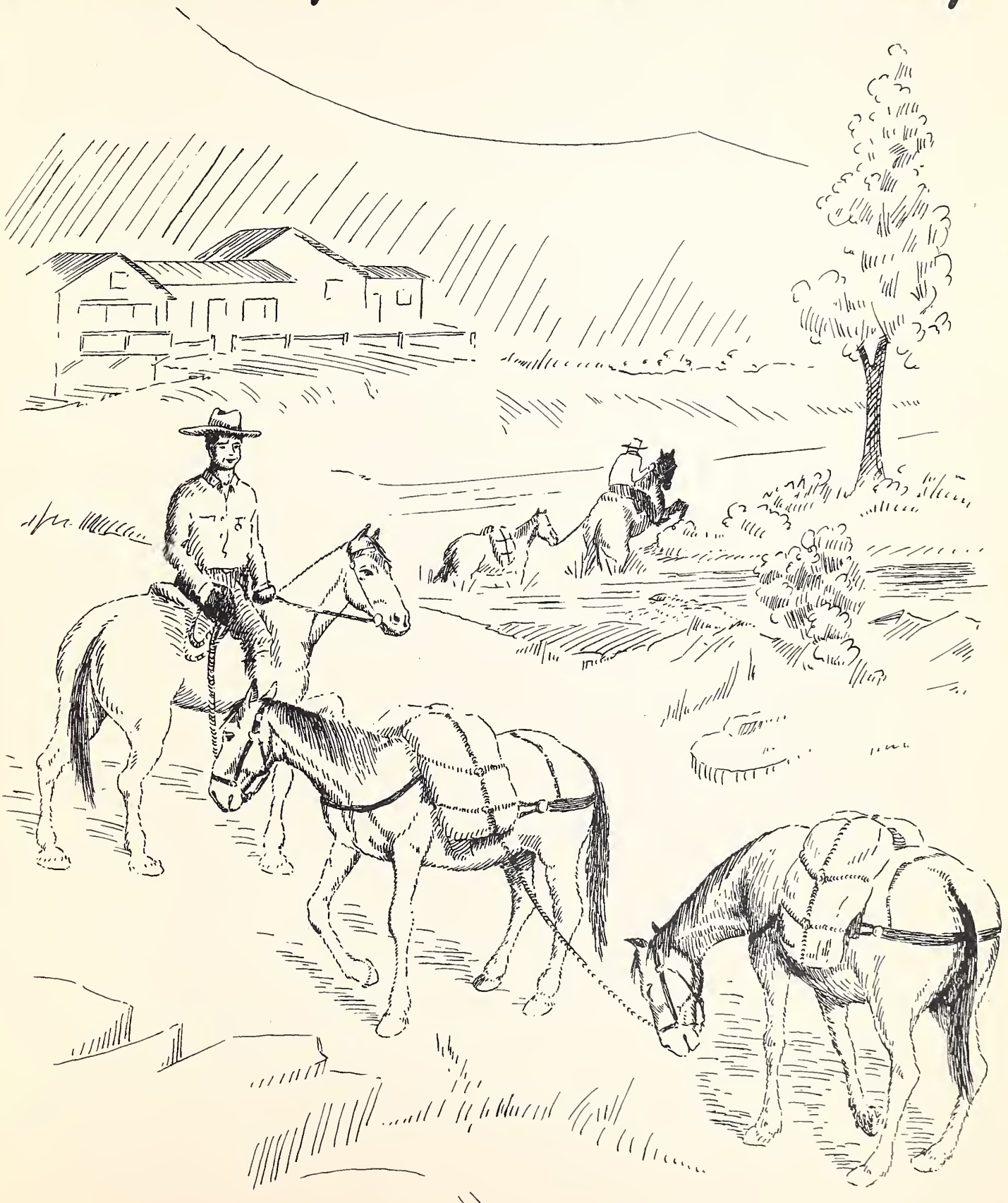


MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
ALL TRAFFIC
CROSSING RIVER

PLATE II

Part Two

External Origin and Destination Study



EXTERNAL
ORIGIN AND DESTINATION SURVEY

In addition to ascertaining the travel habits of traffic crossing the Clark Fork River, it was deemed essential that travel data also be obtained on traffic entering or leaving Missoula from the east and west in order to establish a suitable location for an east-west truck route. Accordingly, two exterior origin and destination stations were established and operated on U.S. 10 East and West.

Drivers of outbound vehicles were interrogated concerning their origin, destination, and trip purpose. Vehicle classification by direction of travel was also recorded. Each station was operated for 16 hours, from 6 A.M. to 2 P.M. and from 2 P.M. to 10 P.M., on alternate weekdays. In addition to the manual counts obtained during the hours of survey, portable counters were operated at each station for a minimum of three weekdays previous to the start of the interviewing.

The number of drivers interviewed compared to the average weekday traffic for June, 1953, follows:

STATION	NUMBER OF INTERVIEWS	AVERAGE WEEKDAY TRAFFIC	PERCENT SAMPLE
U.S. 10 East	2,300	5,905	39%
U.S. 10 West	1,726	5,095	34%
TOTALS	4,026	11,000	37%

In order that the individual trips could be summarized into volumes large enough to indicate significant traffic patterns, the Missoula urban area was divided into the same zones used in the internal survey. Each trip was then numerically coded to the proper zone for IBM processing.

The following charts graphically portray the desire lines of traffic entering the city on U.S. 10.

N

LEGEND

TRAFFIC SCALE

2 EXTERNAL ORIGIN & DESTINATION STATION LOCATION

------ ZONE BOUNDARIES

NOTE: TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR JUNE 1953.

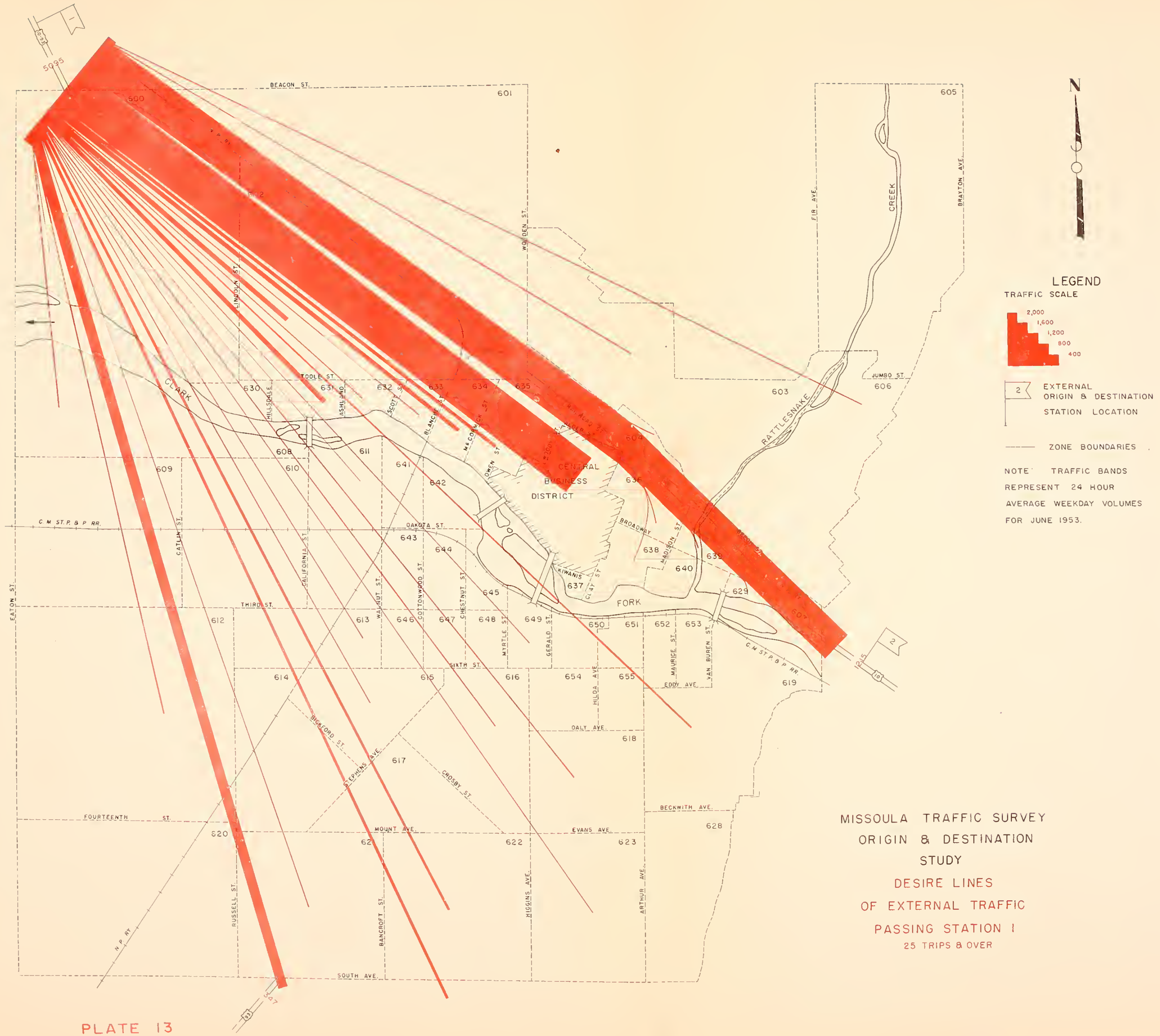
MISSOULA TRAFFIC SURVEY ORIGIN & DESTINATION STUDY

DISTRIBUTION OF ALL TRAFFIC PASSING STATION 1

The distribution of all traffic passing Station 1, both entering and leaving the urban area during an average weekday in June of 1953, is shown on Plate 13.

A summary of traffic at this station follows:

Average Weekday Traffic	5,095
Percent Commercial Vehicles	8.8
Percent to Central Business District	30.5
Percent of Through Traffic (East-West)	23.8
Percent of Through Traffic (West-South)	6.8
Percent South of River	20.3



MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY

DESIRE LINES
OF EXTERNAL TRAFFIC
PASSING STATION 1
25 TRIPS & OVER

PLATE 13

DISTRIBUTION OF ALL COMMERCIAL TRAFFIC PASSING STATION 1

The distribution of all trucks larger than a pickup or panel passing Station 1 on an average weekday in June of 1953 is shown on Plate 14.

A summary of the commercial traffic at this station follows:

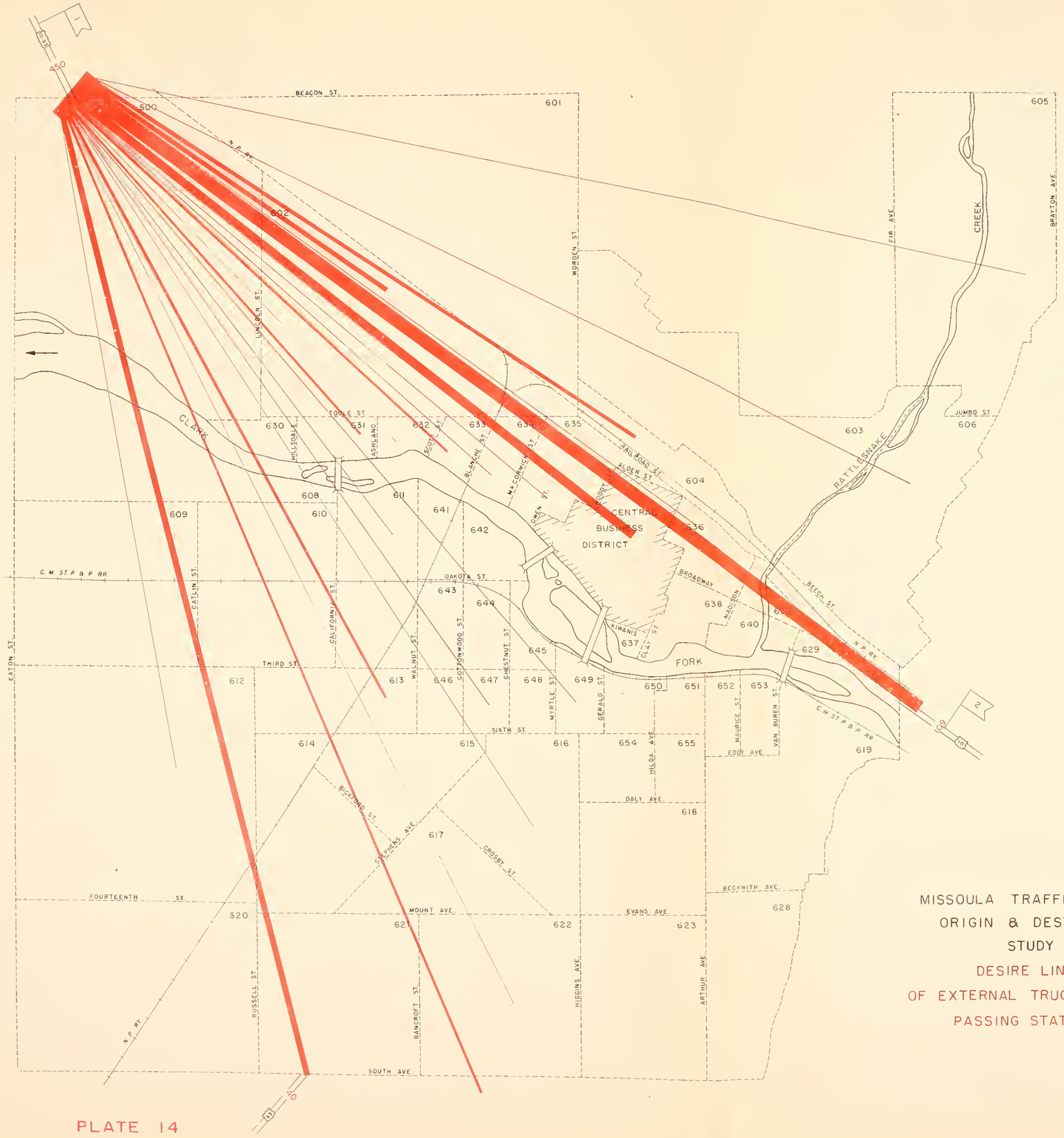
Average Weekday Commercial Traffic.....450

Percent to Central Business District..16.7

Percent South of River.....25.8

Percent Through (West to East).....24.2

Percent Through (West to South)..... 8.9



LEGEND

TRAFFIC SCALE

500
400
300
200
100

2 EXTERNAL ORIGIN & DESTINATION STATION LOCATION

ZONE BOUNDARIES

NOTE: TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR JUNE 1953.

MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DESIRE LINES OF EXTERNAL TRUCK TRAFFIC PASSING STATION 1

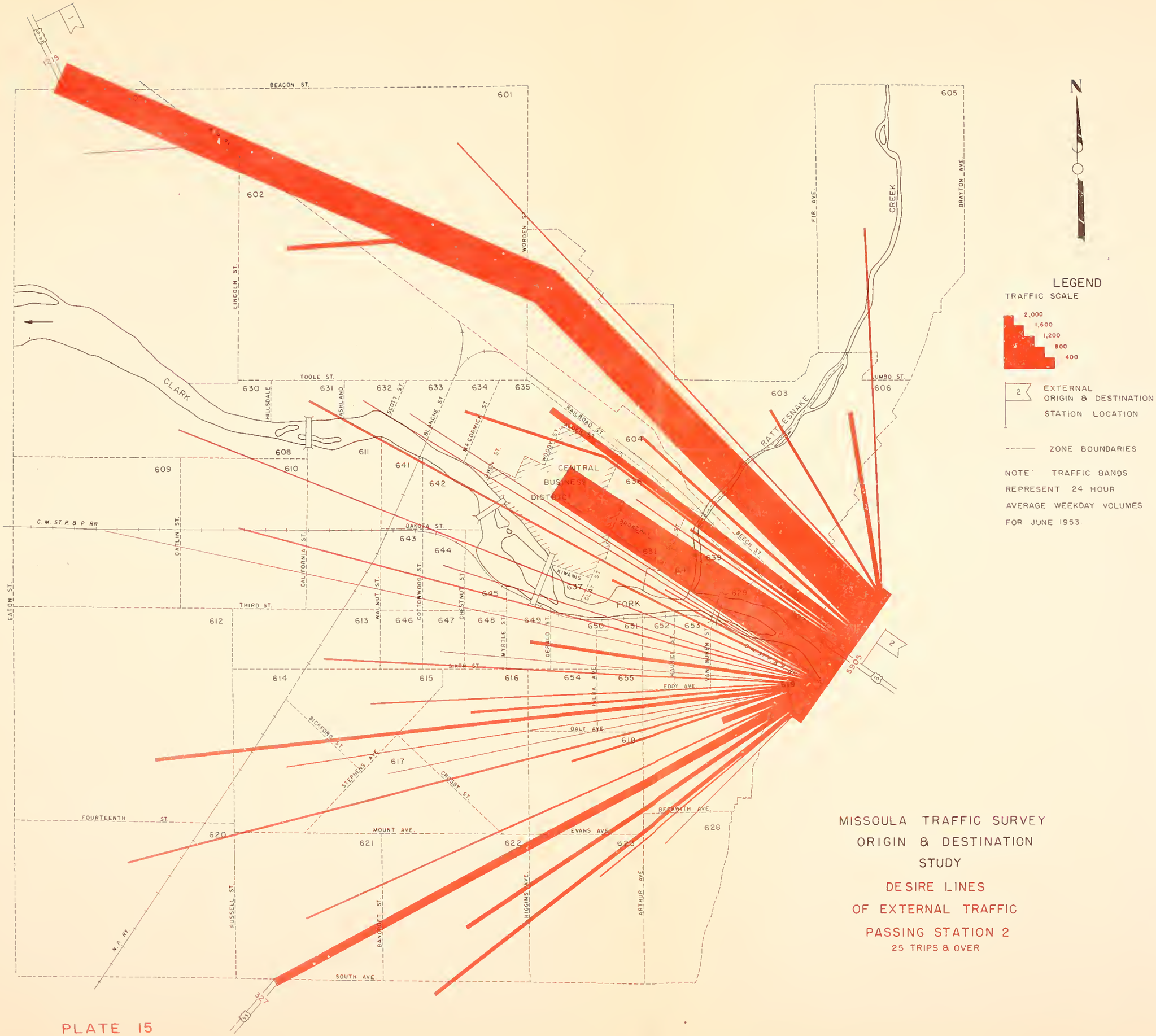
PLATE 14

DISTRIBUTION OF ALL TRAFFIC PASSING STATION 2

The distribution of all traffic passing Station 2, both entering and leaving the urban area, during an average weekday in June of 1953 is shown on Plate 15.

A summary of traffic at this station follows:

Average Weekday Traffic	5,905
Percent Commercial Vehicles	7.7
Percent to Central Business District	22.8
Percent of Through Traffic (East to West)	20.6
Percent of Through Traffic (East to South)	5.5
Percent South of River	30.2


N
LEGEND
TRAFFIC SCALE
2,000
1,600
1,200
800
400
2 EXTERNAL ORIGIN & DESTINATION STATION LOCATION
ZONE BOUNDARIES
NOTE: TRAFFIC BANDS REPRESENT 24 HOUR AVERAGE WEEKDAY VOLUMES FOR JUNE 1953.
BEACON ST.
CLARK
TOOLE ST.
LINCOLN ST.
WORDEN ST.
FIR AVE.
CREEK
BRAYTON AVE.
JUMBO ST.
RATTLESNAKE
RAILROAD ST.
CENTRAL BUSINESS DISTRICT
BROADWAY ST.
BEECH ST.
KIWANIS
FORK
C.M.ST.P.&P.RR.
DAKOTA ST.
CAITLIN ST.
CALIFORNIA ST.
EATON ST.
THIRD ST.
WALNUT ST.
COTTONWOOD ST.
CHESTNUT ST.
MYRTLE ST.
GERALD ST.
WAUKE ST.
VAN BUREN ST.
SIXTH ST.
HILDA AVE.
EDDY AVE.
DALY AVE.
BICKFORD ST.
STEPHENS AVE.
CROSBY ST.
FOURTEENTH ST.
MOUNT AVE.
EVANS AVE.
BERKWITH AVE.
RUSSELL ST.
BANCROFT ST.
HIGGINS AVE.
ARTHUR AVE.
N.P. RY.
SOUTH AVE.
MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION STUDY
DESIRE LINES
OF EXTERNAL TRAFFIC
PASSING STATION 2
25 TRIPS & OVER
PLATE 15

DISTRIBUTION OF ALL COMMERCIAL TRAFFIC PASSING STATION 2

The distribution of all trucks larger than a pickup or panel passing Station 2 on an average weekday in June of 1953 is shown on Plate 16.

A summary of the commercial traffic at this station follows:

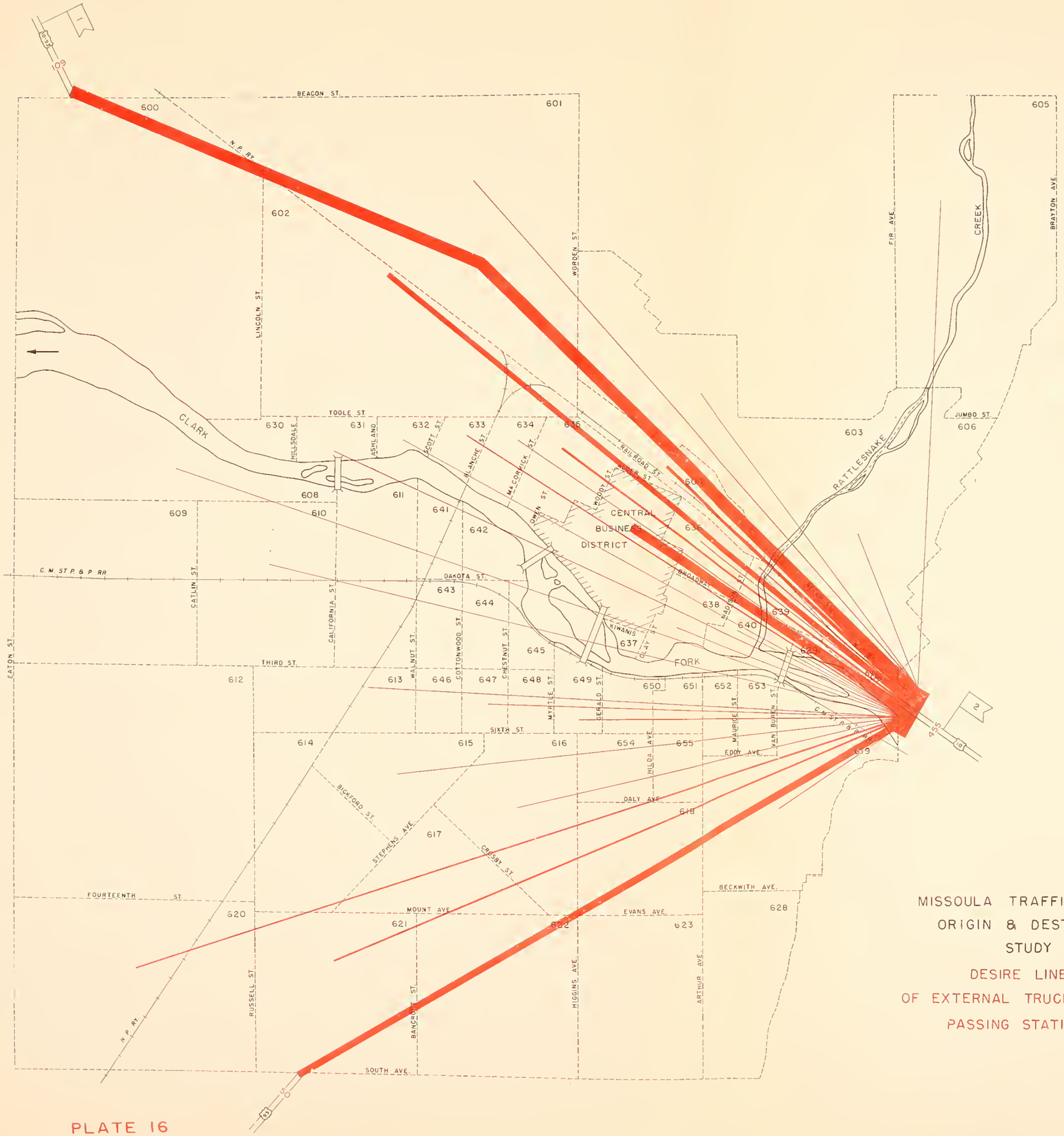
Average Weekday Commercial Traffic..... 455

Percent to Central Business District..16.0

Percent South of River.....25.3

Percent Through (East to West).....24.0

Percent Through (East to South).....11.0



MISSOULA TRAFFIC SURVEY
ORIGIN & DESTINATION
STUDY
DESIRE LINES
OF EXTERNAL TRUCK TRAFFIC
PASSING STATION 2

PLATE 16